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CLAIMS

1. Crosslinked microparticles of between 10 and 300 nm in size, obtained by polymerization of a composition of ethylenically unsaturated polymerizable compounds, characterized in that the composition of the polymerizable compounds comprises:
- a first component A representing from 50 to 99 mol% of the said composition and consisting of isobornyl (meth)acrylate and/or norbornyl (meth)acrylate and/or cyclohexyl (meth)acrylate and/or Cardura E10 (meth)acrylate and optionally in combination with a C<sub>2</sub>-C<sub>8</sub> alkyl (meth)acrylate
  - a second component B consisting of at least one monomer or oligomer comprising at least two ethylenic unsaturations which can undergo radical-mediated polymerization, the said monomer or oligomer being other than an allylic(meth)acrylate
  - a third component C consisting of at least one monomer or oligomer comprising, in addition to an ethylenic unsaturation which can undergo radical-mediated polymerization, at least one second reactive function f1 which is different from the ethylenic unsaturation
- with the possibility of at least partial chemical modification of the initial functions f1 into final functions f2 under the condition that the functions f1 selected do not react with each other during the polymerization,
- with the sum of the components A, B and C being 100%.
2. Microparticles according to Claim 1, characterized in that they bear functions f1 borne by the component C, which are selected from: epoxy, hydroxyl, carboxyl, carboxylic anhydride, isocyanate, silane, amine, oxazoline, and, where appropriate, functions f1 at least partially modified into functions f2, selected from: (meth)acrylates, vinyls, maleates, maleimides, itaconates, allylic alcohol esters,

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unsaturations based on dicyclopentadiene, C<sub>12</sub>-C<sub>22</sub> unsaturated fatty esters or amides, carboxylic acid salts or quaternary ammonium salts.

3. Microparticles according to either of Claims 1 and 2, characterized in that the component C is present in a molar content of between 0 and 49.5 mol% relative to the sum of the polymerizable compounds, and is selected from: glycidyl (meth)acrylate, C<sub>2</sub>-C<sub>6</sub> hydroxyalkyl (meth)acrylates, (meth)acrylic acid, maleic acid or anhydride or fumaric acid, itaconic acid or anhydride, isocyanatoethyl (meth)acrylate, dimethylaminoethyl (meth)acrylate, 2-(5-methacryloyl-pentyl)-1,3-oxazoline.

4. Microparticles according to one of Claims 1 to 3, characterized in that the component B is selected from multifunctional (meth)acrylate monomers of functionality ranging from 2 to 6, substituted or unsubstituted divinylbenzenes and/or multifunctional (meth)acrylic ester oligomers or unsaturated polyesters of functionality ranging from 2 to 50 and with an Mn of less than 2500.

5. Microparticles according to one of Claims 1 to 4, characterized in that the composition of the polymerizable compounds comprises:

- 50 to 95% of a component A consisting of isobornyl (meth)acrylate and/or norbornyl (meth)acrylate and/or butyl (meth)acrylate
- 0.5 to 10% of a component B consisting of at least one monomer and/or oligomer selected from:
  - di(meth)acrylates of: ethylene glycol, propylene glycol, butanediol, 2-methylpropanediol, neopentyl glycol, hexanediol, diol oligomers with an Mn of less than 2500, preferably polyethers, polyesters or polyurethanes
  - substituted or unsubstituted divinylbenzenes
  - unsaturated polyester oligomers or acrylated acrylic oligomers with an Mn of less than 2500

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and having a number of ethylenic unsaturations per mole of from 2 to 50

- not more than 49.5 mol% of a component C consisting of at least one monomer and/or oligomer selected from:
- (meth)acrylic acid, maleic, fumaric or itaconic acid, when f1 is a carboxyl function
  - maleic anhydride or itaconic anhydride when, f1 is a carboxylic anhydride function
  - hydroxyalkyl (meth)acrylates containing a C<sub>2</sub>-C<sub>6</sub> alkyl or mono(meth)acrylates of polyether- or polyester- or polyurethanediol or polycaprolactone oligomers with and Mn of less than 1500, when f1 is a hydroxyl function
  - glycidyl (meth)acrylate, (meth)acrylates of epoxidized derivatives of dicyclopentadiene or epoxidized vinylnorbornene (meth)acrylates or alkoxylated glycidyl ether (meth)acrylates or (meth)acrylates of epoxidized derivatives of cyclohexene, when f1 is an epoxy function
  - isocyanatoethyl (meth)acrylate and urethane mono(meth)acrylates derived from diisocyanates, when f1 is an isocyanate function
  - (meth)acrylates bearing a trialkyl- or trialkoxysilane group, when f1 is a silane function
  - dimethylaminoethyl (meth)acrylate or tert-butylaminoethyl (meth)acrylate, when f1 is an amine function
  - 2-(5-(meth)acryloylpentyl)-1,3-oxazoline, when f1 is a oxazoline function

with the sum A + B + C being equal to 100%.

6. Microparticles according to one of Claims 1 to 5, characterized in that they bear carboxyl functions f1 or carboxyl functions f1 which are partially or totally modified into (meth)acrylate and/or vinyl and/or maleate and/or fumarate and/or maleimide and/or carboxylic acid salt functions f2.

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7. Microparticles according to one of Claims 1 to 6, characterized in that they bear epoxy and/or hydroxyl functions f1 or epoxy and/or hydroxyl functions which are partially modified into (meth)acrylate functions f2.

8. Process for preparing microparticles as defined in one of Claims 1 to 7, characterized in that it comprises a step of radical-mediated dispersion polymerization, in non-aqueous medium which is non-solvent for the polymer formed, of a composition of polymerizable compounds as defined in one of Claims 1 to 5, without any addition of stabilizing polymer for the microparticles formed, either before, during or after polymerization, it being possible for the said process to comprise, where appropriate, an additional step of at least partial chemical modification of the functions f1 borne by the component C as defined in one of Claims 1 to 3 and 5.

9. Coating or moulding or composite composition, characterized in that it comprises microparticles as defined in one of Claims 1 to 7.

10. Composition according to Claim 9, characterized in that it is crosslinkable and consists solely or essentially of microparticles as defined in one of Claims 1 to 7, comprising functions f1 and/or f2 which are identical or different and which can be crosslinked between microparticles, forming at least one crosslinking network.

11. Composition according to Claim 9, characterized in that it comprises from 0.5 to 50% by weight of microparticles as defined in one of Claims 1 to 7.

12. Composition according to one of Claims 9 to 11, characterized in that the said composition is a coating composition.

13. Composition according to Claim 12, characterized in that the coating composition is a composition which can undergo radical-mediated crosslinking, comprising acrylic or vinyl mono- or

multifunctional monomers and/or multifunctional acrylic oligomers and microparticles defined according to one of Claims 1 to 7, bearing (meth)acrylate and/or maleate and/or fumarate and/or maleimide functions f2 obtained from the at least partial modification of the starting functions f1.

14. Composition according to Claim 12 or 13, characterized in that the coating composition is a composition which can undergo crosslinking by radiation.

15. Composition according to Claim 13 or 14, characterized in that the crosslinkable composition comprises, as acrylic monomers, isobornyl (meth)acrylate and/or isodecyl (meth)acrylate, lauryl (meth)acrylate, 2-(2-ethoxyethoxy)ethyl (meth)acrylate, tridecyl (meth)acrylate, 2-phenoxyethyl (meth)acrylate, tetrahydrofurfuryl (meth)acrylate, and/or, as acrylic oligomers, at least one acrylic oligomer chosen from: polyether (meth)acrylates, polyester (meth)acrylates, polyurethane (meth)acrylates, polycaprolactone (meth)acrylates, epoxy (meth)acrylates and (meth)-acrylated acrylic copolymers.

16. Coating composition as defined in one of Claims 12 to 14, characterized in that it is intended to be applied or is applied in the form of a coating on polar or non-polar substrates and comprises:

- 0.5 to 50% and preferably from 5 to 30% by weight of microparticles as defined in one of Claims 1 to 7, bearing (meth)acrylate and/or maleate and/or fumarate and/or maleimide functions f2
- 50 to 99.5% by weight of at least one monomer chosen from isobornyl (meth)acrylate and/or isodecyl (meth)acrylate or lauryl (meth)acrylate or tridecyl (meth)acrylate
- 0 to 5% by weight of C<sub>2</sub>-C<sub>6</sub> alkylenediol di(meth)acrylate

the percentages being chosen such that the total sum of the microparticles and monomers is equal to 100%.

17. Coating composition according to Claim 16, characterized in that:

- the polar substrates are: glass, steel, aluminium, silicon, polycarbonate, wood, glass fibres, carbon fibres, cellulose fibres, polyester or polyamide fibres
- the non-polar substrates are: polyolefins and more particularly polyethylene, polypropylene and ethylene/propylene copolymers with or without special surface treatment, and coatings of low surface tension.

18. Coating composition according to Claims 16 or 17, characterized in that it is applied to the substrate in the form of a thin film with a thickness of less than 100 microns, preferably less than 50 microns.

19. Composition according to Claim 12, characterized in that the said coating composition is a composition of aqueous dispersion of crosslinkable polymer, comprising reactive water-dispersible or water-soluble microparticles, which participate in the crosslinking.

20. Coating composition according to one of Claims 9 to 12, characterized in that the said composition is a composition comprising epoxidized derivatives.

21. Coating composition according to Claim 20, characterized in that it can undergo crosslinking by UV radiation in the presence of a cationic photo-initiator and comprises microparticles bearing epoxy and/or hydroxyl functions fl.

22. Coating composition according to Claim 20, characterized in that it can undergo crosslinking by condensation reaction with at least one second reactive component selected from: polyamines and/or carboxy-functionalized or carboxylic anhydride-functionalized polymers or copolymers.

23. Coating composition according to Claims 20 and 22, characterized in that, when the composition can be

crosslinked by condensation reaction, it comprises microparticles bearing epoxy and/or hydroxyl and/or carboxyl and/or anhydride functions f1 and/or f2.

24. Coating composition according to one of Claims 9 to 12, characterized in that this composition comprises at least one reactive resin selected from: alkyds or unsaturated polyesters or saturated polyesters or polyamides or polyurethanes or polyureas and microparticles as defined in one of Claims 1 to 7, preferably comprising functions f1 and/or f2 that are reactive with at least one function borne by this or these reactive resin(s).

25. Moulding composition according to Claims 9 to 11, characterized in that it comprises at least one reactive resin selected from: unsaturated polyesters, dicyclopentadiene resins, vinyl esters, epoxides and polyamines or polyurethanes and polyureas or polyurethane-ureas and microparticles as defined in one of Claims 1 to 7, preferably comprising functions f1 and/or f2 that are reactive with at least one function borne by this or these reactive resin(s).

26. Moulding composition according to Claim 25, characterized in that it comprises inorganic and/or organic fillers and/or reinforcing agents chosen from: glass fibres, glass mats, carbon fibres, cellulose fibres, polyester or polyamide fibres.